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<p>(21) International Application Number: PCT/ZA00/00049</p> <p>(22) International Filing Date: 20 March 2000 (20.03.00)</p> <p>(30) Priority Data: 99/2209 19 March 1999 (19.03.99) ZA</p> <p>(71) Applicant (for all designated States except US): LASER OPTRONIC TECHNOLOGIES (PROPRIETARY) LIMITED [ZA/ZA]; Technology House, 75 Hill Street, Ferndale, 2125 Randburg, Gauteng Province (ZA).</p> <p>(72) Inventor; and</p> <p>(75) Inventor/Applicant (for US only): BOND, Anthony, John [ZA/ZA]; 10 Sinkers Road, Olivendale Manor, 2125 Randburg, Gauteng Province (ZA).</p> <p>(74) Agent: JOHN & KERNICK (AN INTELLECTUAL PROPERTY LAW OFFICE OF BOWMAN GILFILLAN INC); P.O. Box 3511, 1685 Halfway House (ZA).</p>	<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>	
<p>(54) Title: CUSTOMISATION OF JEWELLERY</p>		
<p>(57) Abstract</p> <p>A system for the customisation of jewellery comprises: a design server operable to produce a design of a desired jewellery piece to be manufactured; a user access facility operable by a user of the system to access the design server; a communication channel between the design server and the user access facility; and a rapid prototyping facility together with a production facility for manufacturing the desired jewellery piece from a design produced by the design server.</p>		

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CUSTOMISATION OF JEWELLERY

FIELD OF THE INVENTION

5 This invention relates to a system for the customisation of jewellery and, more particularly, but not exclusively, to a system for the customisation of hollow jewellery pieces. The Invention extends further to a method for customisation of jewellery pieces.

BACKGROUND TO THE INVENTION

10 Although, in the description which follows, the invention will be described with particular reference to the customisation of hollow jewellery pieces, it is to be clearly understood that the scope of the invention is not limited to this particular application.

15 Hollow jewellery has, to date, been manufactured by a complex process which includes an electroforming or electrodeposition step.

20 Typically, a prototype model of a desired item of jewellery is hand-crafted as a silver piece. Silver is generally chosen for this purpose due to its malleability, which renders it easy to work. Vulcanised rubber is cast around the silver prototype model and carefully separated to liberate the prototype, thus providing a vulcanised rubber mould of the desired jewellery item. Wax is then injected into the vulcanised rubber mould to produce a wax pattern corresponding to the silver prototype model.

25 It is customary to have a metallic wire projecting from the wax for reasons which will become apparent below.

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The wax pattern is then metallized by dipping it in a silver solution and is thereafter immersed in an electroforming bath containing a gold potassium cyanide solution.

5 An electrical current is then applied between the metallized wax pattern, and an anode electrode immersed in the electroforming bath to cause electrodeposition of gold on the surface of the wax pattern. The rate at which gold is electrodeposited is dependent on the surface area of the pattern and the concentration of gold potassium cyanide in solution.

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Once a sufficiently thick layer of gold has been deposited on the wax pattern, it is then removed from the electroforming bath. The metallic wire is removed, whereupon the workpiece is heated causing the wax of the mould to melt and to pour out through the aperture left by the metallic wire. The jewellery workpiece is then finished, typically by closing off the aperture through which the molten wax was removed.

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It will be appreciated by those skilled in the art that this method of jewellery production is tedious and time consuming and requires a considerable lead-time to bring a new jewellery design to market, due to the necessity of first producing a prototype model of the new item of jewellery, and thereafter making a rubber mould therefrom in order to produce a wax pattern. Furthermore, whilst this prior art method may be cost effective for large production volumes, it significantly increases the cost of customising and manufacturing unique items of hollow jewellery.

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OBJECT OF THE INVENTION

It is the object of this invention to provide a system and a method for the

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customisation of jewellery which will, at least partially, alleviate the abovementioned difficulties and disadvantages.

SUMMARY OF THE INVENTION

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In accordance with this invention there is provided a system for the customisation of jewellery, comprising:

a design server operable to produce a design of a desired jewellery piece to be manufactured;

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a user access facility operable by a user of the system to access the design server;

a communication channel between the design server and the user access facility; and

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manufacturing means for manufacturing the desired jewellery piece from a design produced by the design server.

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Further features of the invention provide for the system to include a database containing a catalogue of standard jewellery piece designs, for the application server to be operable by the user to customise any one or more of the standard jewellery piece designs, and for a new standard jewellery piece design to be downloadable to the database along the communication channel.

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Still further features of the invention provide for the manufacturing means to include a rapid prototyping facility and a production facility, for the rapid prototyping facility to include a computer-aided-design (CAD) processor operable to produce a CAD model of the desired jewellery piece from the design thereof, for the rapid-prototyping facility to produce at least one three-dimensional pattern derived from the CAD model, and for the production

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facility to produce the desired jewellery piece from the at least one three-dimensional pattern.

5 Yet further features of the invention provide for the rapid-prototyping facility to produce the at least one three-dimensional pattern by any one of the techniques of stereo lithography, fused deposition modelling, laminated object manufacturing, selective laser sintering, or any other rapid prototyping technique, for the desired jewellery piece to be a hollow jewellery piece, for the hollow
10 jewellery piece to have at least one gemstone set therein, for the communication channel to be the Internet, and for the user access facility to be an Internet-enabled computer workstation.

In accordance with this invention there is provided a method for the customisation of jewellery, comprising the steps of:
15 providing a design server operable to produce a design of a jewellery piece;

providing a user access facility operable by a user to access the design server along a communication channel between the design server and the user access facility;
20 operating the design server to create a design of a desired jewellery piece to be manufactured; and
manufacturing the desired jewellery piece from the design thereof thus produced.

25 There is also provided for the method to include the step of providing a catalogue of standard jewellery piece designs, for operating the application server to create the design of the desired jewellery piece by customising any one or more of the standard jewellery piece designs, and for downloading a new standard jewellery piece design to the catalogue along the communication channel.

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There is further provided for manufacturing the desired jewellery piece by the steps of:

deriving a CAD model of the desired jewellery piece from the design thereof;
rapid-prototyping at least one three-dimensional pattern derived from the CAD
5 model; and

producing the desired jewellery piece from the at least one three-dimensional pattern.

10 There is still further provided for rapid-prototyping the at least one three-dimensional pattern by any one of the techniques of stereo lithography, fused deposition modelling, laminated object manufacturing, selective laser sintering, or any other rapid prototyping technique.

BRIEF DESCRIPTION OF THE DRAWINGS

15 A preferred embodiment of the invention is described below, by way of example only, and with reference to the accompanying drawings, in which:

FIG. 1 is a schematic representation of a system for the customisation of
20 jewellery, according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

25 Referring to Figures 1 a system for manufacturing hollow jewellery is indicated generally by reference numeral (1).

The system (1) includes a design server (2) operable to produce a design of a jewellery piece to be manufactured, a user access facility (3) in the form of an Internet-enabled computer workstation, a communication channel (4) between

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the design server (2) and the Internet-enabled computer workstation (3), and a manufacturing means indicated generally by reference numeral (5).

5 In this embodiment, the communication channel (4) is the Internet, and the design server (2) is an Internet Web server.

10 The system (1) also includes a database (6) of standard jewellery designs, which database is housed on the Web server (2) and which is accessible by a would-be purchaser of jewellery through the computer workstation (3). The system (1) also provides for a new design for a hollow jewellery piece to be created by a jewellery designer on a Computer Aided Design (CAD) workstation (not shown) and downloaded through the Internet (4) to the database (6) on the design server (2).

15 The manufacturing means (5) includes a a rapid prototyping facility (7) and a production facility (8).

20 The rapid prototyping facility (7) includes a CAD processor (9) and a Stereo Lithography (SL) machine (10). The CAD processor (9) is connectable to the design server (2).

25 The rapid prototyping facility (9) and its operation is well known in the art but will be described here for completeness. The CAD processor (10) produces data relating to a three-dimensional model of an item of jewellery which is to be manufactured. The three-dimensional CAD model is converted through a translation facility (not shown) into a file format which can be recognised by the SL machine (10). An example of such a file format is the .STL format developed by the Albert Consulting Group.

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The .STL file consists of sets of x, y and z co-ordinates, each set representing a triangular facet on the surface of the three dimensional CAD model.

5 The three-dimensional CAD model is "sliced" into layers by "slice" software (9) to produce program steps which guide the SL machine (8) in producing a three-dimensional pattern (11) of the hollow jewellery piece.

10 The SL Machine (10) has a laser which generates an ultraviolet beam, and a vat equipped with an elevator table. The vat is filled with a photopolymerisable liquid resin. With the elevator table set just below the surface of the liquid resin in the vat, the laser is directed over the surface of the resin to solidify a two-dimensional cross-section on the surface of the photopolymer corresponding to the first "slice" of the three-dimensional CAD model. The elevator table is then dropped sufficiently to cover the solid polymer with another layer of liquid resin and the
15 laser then solidifies the next "slice" of the model. In this manner, a three-dimensional pattern (not shown) of the hollow jewellery piece is built from the bottom slice up. The three-dimensional pattern (not shown) can be solid, but it is known for the interior of the pattern to be formed as a lattice in order to decrease the weight of the pattern and to minimise the consumption of
20 photopolymerisable liquid resin in the production of the pattern.

25 In use, a purchaser of jewellery accesses the database (6) of available jewellery designs on the Web server (2) by means of the Internet-enabled computer workstation (3). The user selects a jewellery design and is prompted to enter sizing and other user-specific configuration data. The selected design and the user-specific data is downloaded onto the CAD processor (9) which produces therefrom data relating to a CAD model of the selected jewellery item.

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Manufacture of the selected jewellery item is then effected from the three-dimensional CAD model according to any applicable production process in the production facility (8). For example, the desired jewellery piece may be manufactured by rapid-prototyping from the CAD model a three-dimensional pattern of the desired jewellery piece, electrodepositing a layer of metal on the surface of the three-dimensional pattern thus produced.

Alternatively, forming tools for forming the jewellery piece may be designed from the CAD model of the jewellery piece, and CAD models of the forming tools themselves produced by the CAD processor (9). Three-dimensional patterns of the forming tools themselves are then rapid-prototyped in the rapid-prototyping facility (7) and moulds of the forming tools produced from these patterns by techniques which are well known in the art and which not be described here in detail. The forming tools are then cast from the moulds and then used to form the jewellery piece.

It will be appreciated by those skilled in the art that the use of a CAD model of a desired jewellery piece in conjunction with a rapid-prototyping facility enables jewellery to be rapidly and economically customized to individual users' requirements.

The invention therefore provides a system and a method for manufacturing jewellery pieces which reduces the number of design steps and iterations employed in prior art equivalents, and which facilitates the mass-customization of hollow jewellery pieces.

CLAIMS

1. A system for the customisation of jewellery, comprising:
a design server operable to produce a design of a desired jewellery piece to be manufactured;
5 a user access facility operable by a user of the system to access the design server;
a communication channel between the design server and the user access facility; and
10 manufacturing means for manufacturing the desired jewellery piece from a design produced by the design server.
2. A system as claimed in claim 1 which includes a database containing a catalogue of standard jewellery piece designs.
- 15 3. A system as claimed in claim 2 in which the application server is operable by the user to customise any one or more of the standard jewellery piece designs.
- 20 4. A system as claimed in either one of claims 2 or 3 in which a new standard jewellery piece design is downloadable to the database along the communication channel.
- 25 5. A system as claimed in any one of the preceding claims in which the manufacturing means includes a rapid prototyping facility and a production facility.

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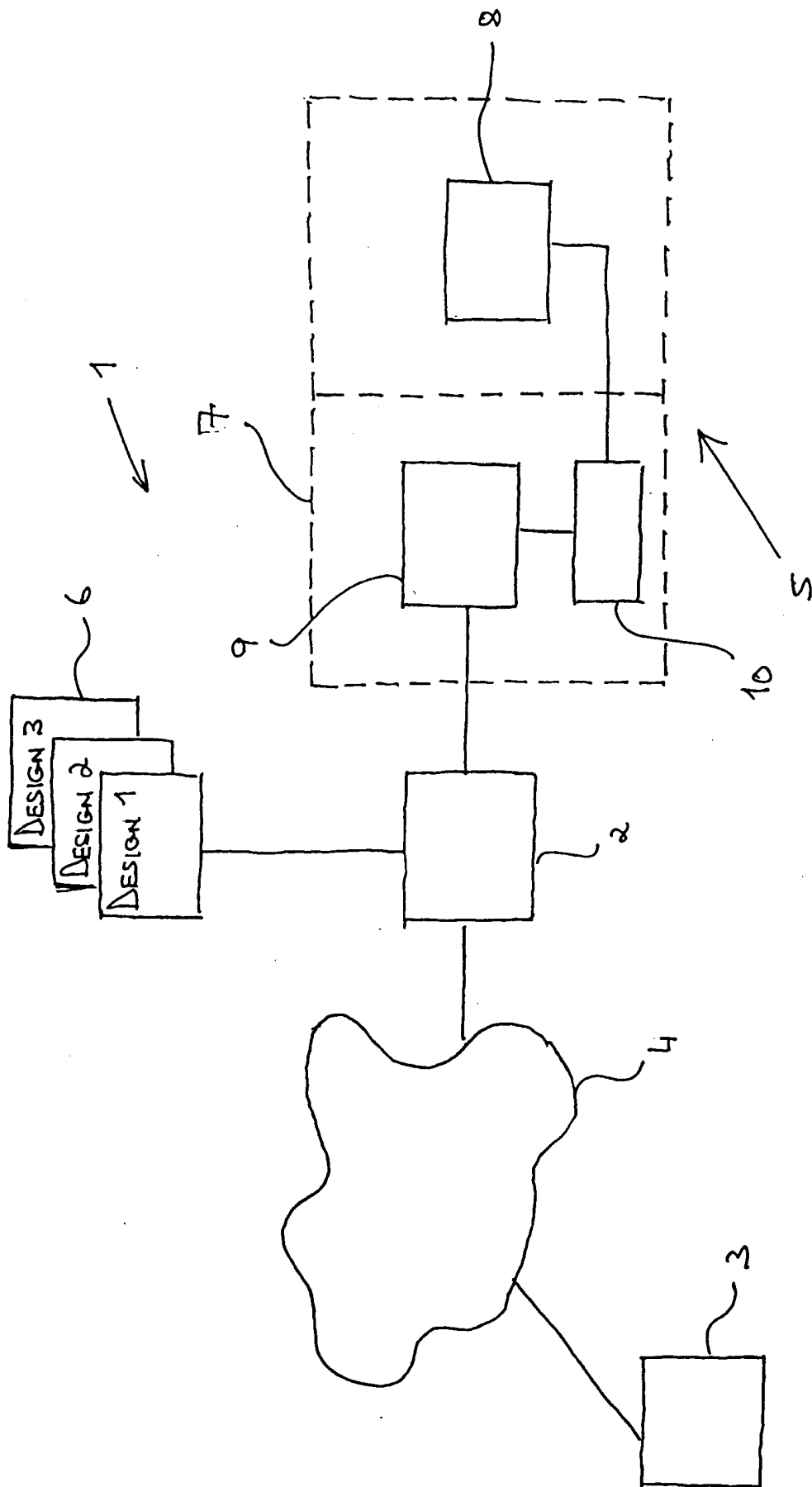
6. A system as claimed in claim 5 in which the rapid prototyping facility includes a computer-aided-design (CAD) processor operable to produce a CAD model of the desired jewellery piece from the design thereof.
- 5 7. A system as claimed in claim 6 in which the rapid-prototyping facility produces at least one three-dimensional pattern derived from the CAD model.
8. A system as claimed in claim 7 in which the production facility produces the desired jewellery piece from the at least one three-dimensional pattern.
- 10 9. A system as claimed in claim 8 in which the rapid-prototyping facility produces the at least one three-dimensional pattern by any one of the techniques of stereo lithography, fused deposition modelling, laminated object manufacturing, selective laser sintering, or any other rapid
15 prototyping technique.
10. A system as claimed in any one of the preceding claims in which the desired jewellery piece is a hollow jewellery piece.
- 20 11. A system as claimed in claim 10 in which the hollow jewellery piece has at least one gemstone set therein.
12. A system as claimed in any one of the preceding claims in which the communication channel is the Internet.
- 25 13. A system as claimed in claim 12 in which the user access facility is an Internet-enabled computer workstation.

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- 5 14. A method for the customisation of jewellery, comprising the steps of:
providing a design server operable to produce a design of a jewellery piece;
providing a user access facility operable by a user to access the design
server along a communication channel between the design server and the
user access facility;
operating the design server to create a design of a desired jewellery piece
to be manufactured; and
manufacturing the desired jewellery piece from the design thereof thus
produced.
- 10 15. A method as claimed in claim 14 which includes the step of providing a
catalogue of standard jewellery piece designs.
- 15 16. A method as claimed in claim 15 in which the application server is operated
to create the design of the desired jewellery piece by customising any one
or more of the standard jewellery piece designs.
- 20 17. A method as claimed in either one of claims 15 or 16 in which a new
standard jewellery piece design is downloaded to the catalogue along the
communication channel.
- 25 18. A method as claimed in any one of claims 14 to 17 in which the desired
jewellery piece is manufactured by the steps of:
deriving a CAD model of the desired jewellery piece from the design thereof;
rapid-prototyping at least one three-dimensional pattern derived from the
CAD model; and
producing the desired jewellery piece from the at least one
three-dimensional pattern.

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19. A method as claimed in claim 18 in which the at least one three-dimensional pattern is rapid-prototyped by any one of the techniques of stereo lithography, fused deposition modelling, laminated object manufacturing, selective laser sintering, or any other rapid prototyping technique.
- 5
20. A system for the customisation of jewellery, substantially as herein described with reference to and as illustrated in the accompanying drawings.
- 10
21. A method for the customisation of jewellery, substantially as herein described with reference to the accompanying drawings.



INTERNATIONAL SEARCH REPORT

national Application No

PCT/ZA 00/00049

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G05B19/418

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G05B A44C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 93 20522 A (AUTOENGRAVING AB ;ANDERSSON MORGAN (SE)) 14 October 1993 (1993-10-14) the whole document.	1, 14, 20, 21
Y		2-13, 15-19
Y	FR 2 739 951 A (BECK SERGE) 18 April 1997 (1997-04-18) the whole document	2-8, 12, 13, 15-18
A		1
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

3 July 2000

Date of mailing of the international search report

10/07/2000

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

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